CASE STUDY

Bank of America Invests in Alternative-Fuel Vehicles

Bank of America (BOA), a large international banking firm, is finding that alternative-fuel vehicles (AFVs) are a sound investment. Its California fleet is assigned to branch offices throughout the state, many of which are located in major urban areas with severe air-quality problems.

Banking on AFVs

Approximately 60% of BOA's light-duty fleet is compact cars used for carrying materials between branches. Another 30% is vans and minivans used for transporting equipment and parts for automatic teller machines. The remaining 10% is sedans assigned to intermittent loaner use (pool cars) that employees use for customer calls and meetings. BOA also uses shuttle buses to transport employees from commuter rail stations to their work locations. The fleet is deployed under various conditions, ranging from urban stop-and-go to freeway driving. Most of the vehicles accumulate about 2,000 miles per month.

The fleet now includes 10 cargo vans, a passenger van, and a station wagon that run on compressed natural gas (CNG) and an electric 20-passenger shuttle bus. The CNG cargo vans are assigned to metropolitan areas where local gas utility companies operate refueling stations. The electric shuttle bus transports BOA employees between various locations in the downtown Los Angeles area. Nicknamed "The Bolt," this vehicle runs a morning and an afternoon shift, covering about 80-85 miles each way.

Why AFVs?

George Wilson, Vice President and Manager of Fleet Operations, made the decision to purchase AFVs for BOA's California fleet. Wilson explains: "The Bank is a strong supporter of practices in support of a sustainable environment. In the area of the automotive fleet, our posture was to examine the merits of clean-air vehicles, particularly here in California, where the need for clean air is more than apparent. Our decisions were based on economics and a desire to gain experience in the area of alternative fuels, pending any regulatory mandates that may be looming over the horizon. The Bank also favors the development of zero-emission vehicles (ZEVs) and predicts outcomes favorable to the job market and the economy here in California. We expect many component parts of electric vehicles to be designed and built in our state."

Choosing an Alternative Fuel

In the 1980s, BOA experimented with a pilot test program of 350 methanol (M85) vehicles, which were assigned to branches and administrative departments for sales calls and general business use. At that time, BOA paid $1.39 per gasoline gallon equivalent (GGE) for M85 fuel compared with unleaded gasoline at $1.28 per gallon. BOA discontinued the experimental program as part of company-wide cost-reduction measures.

In the early 1990s, a strong relationship with the local utility company, Pacific Gas & Electric (PG&E), encouraged BOA to try CNG. PG&E offered its own incentives and also coordinated an incentive program run by the California Energy Commission, which encouraged experimentation with CNG. The incentives covered the cost of converting the vehicles from gasoline fuel to CNG and part of the cost of the extra fuel tanks installed on BOA's natural gas vehicles (NGVs). Frank Lozano, Assistant Vice President at BOA, elaborates: "The price of CNG was approximately $0.72 per therm, which is about 85% of the price of gasoline, on an energy equivalent basis. So, we could purchase CNG for about $0.20 cheaper than unleaded gasoline. For every 1,000 miles of travel, we saved $11.00, with a fuel economy of 18 mpg on the NGVs. To justify the additional tank expense of $1,400 per NGV, the vehicle service life needed to reach 154,000 miles. Since the incentive program covered half the cost of the tanks, our NGV service life only needed to reach 77,000 miles. Because we run our vehicles 125,000 miles, the decision was a slam dunk. We invested in the program."

Bank of America researched the attributes of alternative fuels by contacting utility companies, conversion kit suppliers, and trade associations. Lozano explains that BOA ultimately chose NGVs because "it was a move toward cleaner air and lower emissions, an advantage in the operating cost, combined with incentives."

In 1995, BOA expanded its AFV fleet by adding an electric shuttle bus. Lozano feels this move allows BOA to invest in developing electric technology and contribute further to cleaner air.

Building the AFV Fleet Gradually

BOA gained its first experiences with NGVs in 1991, when it purchased three Chevrolet cargo vans and converted them to bi-fuel vehicles in a pilot program. BOA decided on bi-fuel vehicles because CNG refueling stations are not always readily accessible, and bi-fuel vehicles can operate on either CNG or gasoline. BOA also believed that bi-fuel NGVs would command a higher resale value than dedicated NGVs. BOA intended to remove the tanks, the most expensive component, when it retired a vehicle and install them on a new vehicle. However, none of the conversions has been retired yet.

Because no original equipment manufacturer (OEM) offered bi-fuel NGVs at that time, BOA faced the task of selecting a vendor to provide CNG conversion kits for gasoline vans. On the basis of recommendations by PG&E, BOA used both IMPCO and GFI kits. To offset some of the setup costs, BOA decided to install the conversion kits in-house. The first three Chevrolet cargo van conversions used IMPCO kits. In 1993, BOA converted a Ford Escort wagon to bi-fuel. Warranty coverage was a consideration but not a deciding factor in choosing to convert vehicles. Lozano summarizes: "We couldn't get a definitive answer from the OEMs. We knew we were risking our warranty, but the amount of risk would not be known until the failure occurred. We decided to take the risk."

Fleet Facts

Fleet Type:	Bank-delivery and equipment vehicles
Fleet Size:	1,306 vehicles, of which 13 are AFVs
Alternative Fuel:	CNG and electricity
Vehicles:	8 Chrysler dedicated CNG vans; 3 Chevrolet converted bi-fuel vans; 1 Ford converted bi-fuel Escort station wagon; 1 20-passenger electric bus
Location:	California
Mileage Accumulation:	500 miles per week per vehicle

In 1994, Chrysler offered a dedicated NGV cargo van with a warranty, and BOA purchased six of these units. Two more were purchased in 1995. Unfortunately, one of the Chrysler cargo vans was destroyed in an accident in 1996.

Bank of America chose to buy CNG at retail stations rather than invest in its own refueling facilities. Because BOA did not have enough NGVs at any one location to justify centralized refueling, it simply assigned vehicles to areas near where utility companies were building CNG refueling stations.

By The Numbers – CNG Vans

Bi-Fuel Gross Conversion Cost:	$3,000 to $5,000 per van
Dedicated NGV Gross Cost:	$5,400 per van
Fuel Cost:	$0.72 per therm, or about $1.11 per GGE of CNG
CNG Tank Capacity:	2 tanks totaling about 9 GGE of CNG
Fuel Economy:	18 miles per GGE of CNG
Range on CNG:	160 miles
Breakeven Point:	77,000 miles

In January 1995, BOA replaced a diesel shuttle bus with an electric one. It is fueled (charged) and maintained at a central location. The bus runs on four lead-acid battery packs, which are changed between shifts and recharged. The solar panels installed on its roof power the air conditioning and other amenities.

Costs

Bank of America's bi-fuel conversions and dedicated CNG vehicles both cost more than similarly equipped gasoline models. Without financial incentives, BOA would have paid $3,000 to $5,000 more, depending on the type of tank, to install the conversion kits, tanks, and fuel delivery systems. However, incentives from PG&E, the California Energy Commission, and the California Air Resources Board (all regional sources) completely offset this additional cost, and BOA has incurred no further incremental cost in maintaining the converted vehicles.

Chrysler's list price for dedicated NGV cargo vans represented a $4,000 premium above a similarly equipped gasoline vehicle. Incentives offset both this cost and half the cost of additional CNG tanks installed on the vans.

The lower price of CNG offsets the higher capital cost of the NGVs. Although BOA has not received any special discounts on the price of CNG from the gas utilities, it pays about $1.11 per GGE of CNG, compared with an average price of $1.28 per gallon of gasoline. Therefore, BOA saves about $0.17 per GGE of CNG. When lower fuel costs are used to offset the net incremental cost of $700 for the NGV cargo vans, BOA expects to break even on its investment at about 77,000 miles. Because BOA drives each fleet vehicle for about 125,000 miles, it expects to realize ultimate savings of more than $400 per NGV compared with a similar gasoline vehicle.

The electric shuttle bus is a prototype hand-built by U.S. Electricar. It was expensive – $185,000 compared with $60,000 to $80,000 for a similar diesel bus.

As with any prototype, kinks had to be worked out. BOA experienced problems with the batteries and accessories, and the

controller had to be replaced. However, Lozano says these problems were not greater than expected, and BOA is working closely with U.S. Electricar to improve these vehicles.

In-Use Performance of NGVs

Overall, BOA's drivers are satisfied with the performance of the NGVs. They feel that their driveability is comparable to that of gasoline vehicles. The only difference drivers have noticed is slightly lower power when accelerating.

The cargo vans travel a maximum of 160 miles per day, but an NGV with a single tank has a range of only about 100 miles. Therefore, BOA installed extra tanks on the vans at a gross cost of $1,400 per vehicle (net cost of $700 per vehicle after financial incentives). The dedicated CNG cargo vans average 18 miles per GGE of CNG, and the two storage tanks hold about 9 GGE. The vans fill up with CNG at the end of each work day. In contrast, the bi-fuel conversions and gasoline vehicles are refueled only when necessary at the most convenient refueling station.

NGV Purchase Cost

Dedicated NGV Premium:	$4,000
Extra Tank Cost:	$1,400
Gross Cost:	$5,400
Combined Financial Incentives: *(see text)*	-$4,700
Net Cost:	$700

The extra CNG fuel tank results in a loss of storage space that limits how the NGV cargo vans can be used and their versatility. The storage tanks are mounted behind the driver's seat beyond the protective screen that is installed on all cargo vans, whether gasoline or CNG, to prevent transported materials from slamming into the driver during a sudden stop.

Lozano characterizes maintenance of the NGVs as a "non-event." Some CNG vehicles are maintained in-house, while

Payback Analysis (Dedicated CNG Vehicles)

Per-Gallon Fuel Savings

= ($1.28/gallon of gasoline) - ($1.11/GGE of CNG) = $0.17/GGE of CNG

Breakeven

= [($700 net cost/NGV tanks) ÷ ($0.009 savings/mile) ~ 77,000 miles] ÷ (500 miles/week) ~ 3 years

Excess Miles in Service Life of NGVs

= (125,000 miles) - (77,000 miles) = 48,000 miles

Net Savings per NGV

= (48,000 miles) x ($0.009 savings/mile) = $400

others are maintained in the private service sector, generally following the particular practices of the local branch office. Except for periodic tank inspection, the NGVs do not require special maintenance procedures, they do not require more frequent repairs than gasoline vehicles, nor do they present any special safety problems. Also, BOA has incurred no special maintenance costs for the conversion kits on bi-fuel vehicles.

Before taking delivery on the NGVs, BOA held meetings and distributed documentation to prepare drivers. BOA played a film provided by utility companies that showed safety demonstrations under severe conditions. PG&E also trained and certified drivers in refueling NGVs.

Recommendations

In summary, Lozano commented that the NGVs had met BOA's expectations: "Our expectations were to have equal fuel economy, driveability, and durability of the vehicles themselves. We wanted to match the performance of gasoline in those criteria. These expectations were met." If faced with the same situation again, BOA would choose to acquire NGVs.

When asked for suggestions to guide other fleet managers considering AFVs, Lozano warned other fleet managers to be careful of advertised ranges and to expect to add a second CNG tank. He hopes that auto manufacturers continue to build AFVs, such as cargo vans, that fleets can use.

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PEER REVIEWED

This brochure has been reviewed by representatives of vehicle manufacturers, fuel providers, fleet operators, and federal and state governments.

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Disclaimer

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